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ume and enhance its interest for geologists. A list of the portraits, besides that of the subject of the memoir, is as follows: De La Beche, Logan, Aveline, Selwyn, Bristow, Gibbs, Oldham, Smyth, Jukes, Forbes, Murchison, and Salter.

R. D. S.

Meteorology—Weather and Methods of Forecasting. Description of Meteorological Instruments and River Flood Predictions in the United States. By THOMAS RUSSELL, U. S. Assistant Engineer. Macmillan & Co., New York, 1895, pp. xxiii., 277. Illustrations and maps.

The scope of this new work on meteorology is indicated by the title page. As the author states in the preface, the main object of this book is to explain the use of the weather map, where it can be of use for the purpose of making predictions. The method is based mainly on statistics of the observed condition of the air as to pressure, temperature, and humidity of particular types, and the weather following twenty-four hours or more after the occurrence of the type. As a most important aid to this work the author gives a series of twenty-two type weather maps, each representative of about ten cases. Accompanying each of these are maps showing the rainfall (1) for the twenty-four hours preceding the date of the weather map (2) for the twenty-four hours succeeding, and (3) for the time from twenty-four to forty-eight hours after. By the aid of these maps the successful prediction of storms will be greatly aided.

The methods of predicting river heights for some important points along the lower Mississippi and its tributaries are given at some length. Rules and tables are given for computing the rise of floods when data from points higher up the stream are known. Another chapter is given to a brief description of various meteorological instruments, the list of which is quite complete. The principles involved in their construction are considered.

In addition to these topics, "almost everything that is considered to be of interest in relation to the weather is here given. The principal weather changes are described as they occur in various parts of the world in different seasons on land and sea, and their causes narrated so far as known. A collection of facts is given, useful in forming a conception of the phenomena of the atmosphere."

The chief criticism to be made of the book is lack of orderly

arrangement and scientific treatment. Long collections of facts are given, which not infrequently have no close logical or causal connection with each other. The book contains a vast amount of information, some of which is so incomplete as to be almost misinformation, arranged on the dictionary or encyclopædia style—interesting reading, but rather disconnected. It is to be feared that a beginner would form a very hazy notion of the science of meteorology, particularly of the broad principles underlying the details of the science from a perusal of it. As a reference book on some points and a storehouse of facts it is valuable to the student. The series of weather maps already alluded to cannot fail to be of great assistance. H. B. K.

Air-breathing Animals of the Palæozoic in Canada, up to 1894,
by SIR WM. DAWSON, C.M.G., LL.D., F.R.S. Trans. Roy.
Soc. Canada, Section IV., 1894, pp. 71–88.

“Our knowledge of the animal inhabitants of the land in Palæozoic time is very meager in comparison with what is known of marine creatures. There was probably less land in early Palæozoic ages than later. Atmospheric conditions may have been less favorable to breathers in air. Life on land requires a higher nervous and muscular system than those necessary in water, and different means of respiration.” Animal life therefore probably originated in the waters. A long time may have been required to introduce the land life. The chances of preservation of aquatic organisms were much greater than were those of terrestrial species. The paucity of land fossils may be accounted for by these less favorable conditions.

The finding of Batrachian footprints by Logan in 1841 was the first indication of air-breathing vertebrates in the Carboniferous rocks. The first discovery of osseous remains of Palæozoic land vertebrates in America was that of *Baphetes planiceps* found by the author in the Pictou coal field in 1850. The first announcement of Devonian insects was from St. Johns, N. B., in 1862 by Hartt. Insects had previously been found in the Carboniferous of Europe, and have since been traced back to the Silurian. The earliest known Carboniferous millipede was *Xylobius sigillaria*, discovered by the author in Nova Scotia in 1858. Many millipedes have since been found in the Carboniferous and Devonian on both sides of the Atlantic. The first known land snail was found by Lyell and the author at South Joggins in 1851.